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EXAMINER	
WANG, EUGENIA	

ART UNIT	PAPER NUMBER
1795	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/821,368	MIYAKI ET AL.	
	Examiner	Art Unit	
	EUGENIA WANG	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 September 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3 and 4* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3 and 4* is/are rejected.

7)☒ Claim(s) *1* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. In response to the amendment received September 14, 2009:

a. Claim 2 has been cancelled as per Applicant's request. Claims 1, 3, and 4 are pending.

b. The core of the previous rejection is maintained with any slight changes made in light of the amendment (removal and shifting of claim limitations; see "Response to Arguments" section below for further details). All changes to the rejection are made in light of the amendment, thus the action is final.

Claim Objections

2. Claim 1 is objected to because of the following informalities: having the awkward phrasing of "amorphous or a microcrystalline compounds" (line 13). The descriptors and noun contradict one another (i.e. should be "an amorphous" and "a microcrystalline" with "compound" or "amorphous" and "microcrystalline" with "compounds"). Appropriate correction is required.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

3. Claims 1 and 3-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over EP 0704921A1 (Fujimoto et al.) in view of WO 01/29918 (Ikeda et al.). (Note: US 7241533 is being relied upon as an English translation for WO 01/29918, both of which stem from PCT/JP00/07297).

As to claim 1, Fujimoto et al. teaches a cylindrically wound battery, where the electrode material mixture (both positive electrode, cathode, and negative electrode, anode are included) is present on both the inner and outer sides of the current collector (abs). Furthermore, the negative electrode active material is chosen such that the efficiency of lithium intercalation and deintercalation is high (p3, lines 37-39). The compounds used in the negative electrode materials are from groups IIIb, IVb, and Vb of the periodic table. One specific formula of the active material used is $SnSi_tP_uAL_vO_s$ represented by formula (V) (p4, line 50) (both tin and silicon containing). Furthermore, the use of tin monoxide and silicon dioxide is exemplified in the synthesis examples 1-5 (p7-8).

It is again emphasized that Fujimoto et al. appreciates tin-silicon oxide materials, as seen in several examples under synthesis example 1 (p7, lines 1-30). It is noted that crystallinity and lack thereof (wherein a lack of crystallinity indicates amorphousness) is discussed. It is stated that a crystalline structure has a diffraction line between 2θ=40° to 70° (p7, lines 7-14). As seen in the appreciated examples, either crystallinity is present (wherein B/A >0, as B is defined as the diffraction line measure), or crystallinity is not present (indicating no crystallinity and thus amorphousness). For example, the appreciated compound at 1-G at p7, line 20 is $SnSi_{0.5}Pb_{0.5}O_3$, wherein B/A=0.3, which indicates crystallinity. Additionally, example 1-Q at p7, line 30 is $SnSi_{0.9}O_{2.8}$, wherein B/A=0, which indicates no crystallinity (amorphousness). It is noted that such structures showing crystallinity is interpreted to be microcrystalline, as crystallinity exists and particle sizes are defined using micrometers, thus indicating a micro-sized scaling (i.e.

the average particle size is 4.5 μm for synthesis example 1, as seen on p7, line 6). This interpretation is taken barring specification as to what constitutes microcrystalline. Office personnel are to give claims their broadest reasonable interpretation in light of the supporting disclosure. *In re Morris*, 127 F.3d 1048, 1054-55, 44 USPQ2d 1023, 1027-28 (Fed. Cir. 1997). Also, limitations appearing in the specification but not recited in the claim are not read into the claim. See *In re Zletz*, 893F.2d 319, 321-22,13 USPQ2d, 1320, 1322 (Fed. Cir. 1989). In such a manner the Si or Sn compounds are either amorphous or microcrystalline.

It is furthermore noted that Fujimoto et al. teach of average particle sizes of its negative active material. For example, a tin-silicon-oxide (negative active material) of synthesis example 1 has an average particle size of 4.5 μm (which falls into the particle diameter size as claimed, 0.1-35 μm) (p7, lines 3-6). Although it is not specifically stated that all of the particles fall within the claimed size, Fujimoto et al.'s teaching of embodied average particle sizes would at least render obvious the use of particles of such a size, as such a size is specifically noted. Accordingly, one of ordinary skill in the art would find it obvious to make the negative active material having a size of 4.5 μm, as Fujimoto et al. specifically embodies such a desired size, wherein the use of active material of this size would have provided the predictable result of creating a working battery. Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to make a battery with an active material having a size of 4.5 μm (and sizes close to that), as Fujimoto et al. specifically embodies negative active material with particles having such an average size, and thus

the use of active material particles of such a size within a battery would yield the predictable result of forming an operating battery. Furthermore, it is noted that particle sizes of active materials are seen as result effective variables, as particle sizes would affect physical characteristics that would help optimize battery operation. For example, particle sizes would alter things such as surface area of the active material available for chemical reaction, packing density (amount of active material within the anode available for chemical reaction as well as porosity, which would allow for ion transport). It would have been obvious to one having ordinary skill in the art at the time the invention was made to optimize the size of the particle size (i.e. to between 0.1-35 μm), since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch,* 617 F.2d 272, 205 USPQ 215 (CCPA 1980). It has been held that discovering that general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller,*105 USPQ 233. Generally, differences in ranges will not support the patentability of subject matter encompassed by the prior art *unless* there is evidence indicating such ranges is critical. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). *In re Hoeschele*, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969).

As previously stated, the battery of Fujimoto et al. is cylindrical (p2, lines 48-49). NOTE: A cylinder inherently has a circular cross section (sectional surface shape), as is defined by the constraints of a cylindrical volume. A circle is a special type of ellipse; in an ellipse that is a circle, the longest diameter to the shortest diameter is 1:1 (or 1,

inclusive, as claimed by the instant application). Furthermore, it is listed that the thickness of electrode material mixture on the inner side of the collector is from 60% to 97%, more preferably 70% to 95%, of the outer collector. The difference in thickness inherently provides a difference in capacity, as the thicker layer contains more active material, and thus has more capacity. In Fujimoto's teaching, the ratio ranges of capacity of the outer active material to the inner active material would be from 1:0.6 to 1:0.97, inclusive, more preferably 1:0.7 to 1:0.95, inclusive. A portion of Fujimoto et al.'s range covers the claimed ratio, and therefore would inherently provide the same claimed ratio difference.

Alternately, it can be said that Fujimoto et al. do not disclose the specific capacity ratio of the outer anode active material to the inner active anode material that is from 1:0.6 to 1:0.8, inclusive. However, it has been held that when the difference between a claimed invention and the prior art is the range or value of a particular variable, then a prima facie rejection is properly established when the difference in the range or value is minor. Titanium Metals Corp. of Am. v. Banner, 778 F.2d 775, 783, 227 USPQ 773, 779 (Fed. Cir. 1985). Generally, differences in ranges will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such ranges is critical. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). In re Hoeschele, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969). Claims that differ from the prior art only by slightly different (non-overlapping) ranges are prima facie obvious without a showing that the claimed range achieves unexpected results relative to the prior art. (In re Woodruff, 16

USPQ2d 1935,1937 (Fed. Cir. 1990)). Selection of optimum ranges within the prior art's general condition is obvious. (In re Aller, 105 USPQ 233(CCPA 1955)).

Fujimoto et al. does not teach that the anode current collector is made of a plurality of layers including an inner current collector layer and an outer current collector layer.

Two portions of Ikeda et al. are relied upon to render obvious the use of two types of plural layered current collectors.

(1) Ikeda et al. teach of a rechargeable lithium battery where current collectors having layers of active material provided on opposite faces thereof may be prepared from two current collectors each having a layer of active material on its one face by joining the back faces to each other (thus resulting in a two layered current collector with active material on either side) (col. 6, lines 40-45). One having ordinary skill in the art at the time the claimed invention was made would have found it obvious to create a current collector with active material on both sides, as disclosed by Ikeda et al., since such a known method of forming a current collector with active material on opposing sides would yield the predicable result of having a similar structure (active material on both sides of a current collector, whether the current collector is one or two layers), which would have operated in the same manner. Accordingly, it is seen that whether a current collector is a single layer (as embodied in the primary reference, Fujimoto et al.) or plural layers (as taught by Ikeda et al.) lacks criticality, as both would yield the same result of having electrode active material coated on both sides of a current collector for use in a battery. Therefore it would have been obvious to one of ordinary skill in the art

at the time the invention was made to replace the single layered current collector with active material on both sides with a current collector with plural layers wherein active material is on both sides, as Ikeda et al. teach that such a method is known to make a current collector with active material on both sides, and the application of such a method would yield the predicable result of having a similar structure (active material on both sides of a current collector, whether the current collector is one or two layers), which would have operated in the same manner within a battery.

(2) Ikeda et al. teach of current collector made of a metal foil, wherein an interlayer may be provided on each face of the current collector, wherein the interlayer is what faces the active material (col. 2; lines 58-64). In such a manner, it can be interpreted that the composite collector of Ikeda et al. includes the current collector and inter layer on each side (wherein such a final product has a battery wherein the anode active material is on both sides of the composite anode current collector having the plurality of layers defined above). The motivation for using a plural layered composite collector (interlayer-current collector-interlayer) is in order to provide the current collector in the form of a foil that is high in mechanical strength while providing interlayers that are made of materials that can be alloyed with the active material to enable diffusion of the interlayer components into the active materials (col. 2, line 58 to col. 3, line 7). The motivation for wanting use a plural layered composite current collector (as taught by Ikeda et al. and applied to Fujimoto et al.) is to provide a stronger composite current collector that still is capable of alloying with the active materials (col. 2, line 58 to col. 3, line 7). Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed

invention was made to use the plural layered composite current collector (interlayer-current collector-interlayer), as taught by Ikeda et al. in the battery of Fujimoto et al. in order to impart good mechanical strength of the composite collector and good alloying capabilities between the composite collector and the active materials.

As to claim 3, Fujimoto et al.'s outer anode active material layer and the inner anode active material layer are inherently alloyed with the current collector, because the tin used in the exemplified in the anode active material is able to be alloyed with the exemplified anode current collector (copper, as is used in example 1 on p12, lines 22-26).

As to claim 4, in example 1 of Fujimoto et al., a negative electrode material is prepared via dispersion and applied to the current collector (p12, lines 22-26). This application is a liquid-phase deposition.

Response to Arguments

4. Applicant's arguments filed September 14, 2009 have been fully considered but they are not persuasive.

It is first noted that the changes to the claim amendments have changed the rejection. For example, US 6270923 (Bito et al.), previously relied upon, has been withdrawn as a prior art reference with the removal of the claim limitation with respect to primary particles. The use of WO 02/21616 (Fukui et al., using US 2004/0043294 as a translation), previously relied upon, has been withdrawn with respect to the removal of the limitation with respect to alloying through heat treatment. It is noted that the changes to the claim language necessitated such a change in the rejection and that that

the re-application of such references would be proper upon the re-addition of such claim limitations.

Since Bito et al. and Fukui et al. are not currently not being relied upon within the rejection, all arguments with respect to such references are moot.

Applicant argues that Fujimoto et al. does not teach that the active material layers (outer and inner) include amorphous or microcrystalline compounds of silicon or tin.

Examiner respectfully disagrees. Such a position is reiterated herein for clarity's sake. As set forth in the rejection, Fujimoto et al. teach a cylindrically wound battery, where the electrode material mixture (both positive electrode, cathode, and negative electrode, anode are included) is present on both the inner and outer sides of the current collector (abs). Furthermore, Fujimoto et al. appreciates tin-silicon oxide materials, as seen in several examples under synthesis example 1 (p7, lines 1-30). It is noted that crystallinity and lack thereof (wherein a lack of crystallinity indicates amorphousness) is discussed. It is stated that a crystalline structure has a diffraction line between 2θ=40° to 70° (p7, lines 7-14). As seen in the appreciated examples, either crystallinity is present (wherein B/A >0, as B is defined as the diffraction line measure), or crystallinity is not present (indicating no crystallinity and thus amorphousness). For example, the appreciated compound at 1-G at p7, line 20 is $SnSi_{0.5}Pb_{0.5}O_3$, wherein B/A=0.3, which indicates crystallinity. Additionally, example 1-Q at p7, line 30 is $SnSi_{0.9}O_{2.8}$, wherein B/A=0, which indicates no crystallinity (amorphousness). It is noted that such structures showing crystallinity is interpreted to

be microcrystalline, as crystallinity exists and particle sizes are defined using micrometers, thus indicating a micro-sized scaling (i.e. the average particle size is 4.5 μm for synthesis example 1, as seen on p7, line 6). This interpretation is taken barring specification as to what constitutes microcrystalline. Office personnel are to give claims their broadest reasonable interpretation in light of the supporting disclosure. *In re Morris*, 127 F.3d 1048, 1054-55, 44 USPQ2d 1023, 1027-28 (Fed. Cir. 1997). Also, limitations appearing in the specification but not recited in the claim are not read into the claim. See *In re Zletz*, 893F.2d 319, 321-22,13 USPQ2d, 1320, 1322 (Fed. Cir. 1989). In such a manner the Si or Sn compounds are either amorphous or microcrystalline. Accordingly, Examiner submits that Fujimoto et al. does appreciate active material on both sides of a current collector (inner and outer), wherein the active material is either an amorphous or a microcrystalline compound of Sn or Si. Thus, the arguments are not found to be persuasive, and the rejection of record is maintained.

Applicant argues that although Fujimoto et al. teach a particle size of 4.5 μm but does not teach a range the required limitations fall within (wherein no overlapping range or range that lies within exists).

Examiner respectfully disagrees. It is unsure how the appreciation of a particle size of 4.5 μm does not lie within the claimed range of 0.1-35 μm. Thus it is unsure how an appreciated point falling within the claimed range does not at the very least obviate the claimed range. (It is noted that such an appreciated size by Fujimoto et al. is an average size, wherein the rejection to claim 1 has set forth why it would be obvious to use such an appreciated average size as the particle size and why one of ordinary skill

in the art would have appreciated that particle sizes would be a result effective variable with respect to surface area, packing density, porosity. See the rejection to claim 1 for full details.) Accordingly, it is unsure how the claimed range is not obvious over the teaching of Fujimoto et al., which appreciates a particle size of 4.5 μm, which falls into the claimed range. MPEP § 2144.05 with respect to overlapping and overlying ranges supports obviousness via the teaching of Fujimoto et al. Thus, the arguments are not found to be persuasive, and the rejection of record is maintained.

Applicant argues that col. 6 lines 40-45 of Ikeda et al. does not teach of a current collector with a plurality of layers (and that the two current collectors are combined into one) and compares it to the portion cited in col. 4, line 65- col. 5, line 6.

Examiner respectfully disagrees. First of all, the portion cited in col. 6, lines 40-45 clearly state the presence of two layers, as two layers are joined. Therefore, the broad teaching is that two layers can be put back to back to form a composite collector. It is unsure how two layers even if joined (i.e. via adhesive, sintering, welding, etc) would not still comprise of the two original layers. Accordingly, the composite current collector has two joined layers, wherein the integral current collector still comprises the plurality of layers that has formed it and thus reads on the claimed feature, barring further specification as to the structure of the plurality of layers. Office personnel are to give claims their broadest reasonable interpretation in light of the supporting disclosure. *In re Morris*, 127 F.3d 1048, 1054-55, 44 USPQ2d 1023, 1027-28 (Fed. Cir. 1997). Also, limitations appearing in the specification but not recited in the claim are not read into the claim. See *In re Zletz*, 893F.2d 319, 321-22,13 USPQ2d, 1320, 1322 (Fed. Cir.

1989). Additionally, it is noted that the portion Applicant cites as a comparison (col. 4, line 64 to col. 5, line 6) is a teaching with respect to the active material. Accordingly, it has no bearing as to the structure of the current collector. Finally, it is noted that Ikeda et al. also has another embodiment, as set forth within the rejection, wherein Ikeda et al. teaches of a composite current collector having the structure of interlayer-current collector-interlayer, wherein such a structure is also seen to render obvious using plural layers (col. 2, line 58 to col. 3, line 7), and thus renders obvious the claimed invention as well. See the rejection to claim 1 for full details. Accordingly, such arguments are not found to be persuasive, as it is submitted that Ikeda et al. does still render obvious a plural layered current collector. Thus, the rejection of record is maintained.

With respect to the arguments regarding the 103 rejections, Applicant argues that the prior art used to obviate the rejected claims (Ikeda et al.) do not cure the deficiencies of the primary reference (Fujimoto et al.). Applicant does not argue how the combination is not proper. Therefore, the Examiner maintains the obviousness rejections and upholds the rejection of the primary reference, as above.

Conclusion

5. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within

TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to EUGENIA WANG whose telephone number is (571)272-4942. The examiner can normally be reached on 7 - 4:30 Mon. - Thurs., EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/E. W./
Examiner, Art Unit 1795

/PATRICK RYAN/
Supervisory Patent Examiner, Art Unit 1795